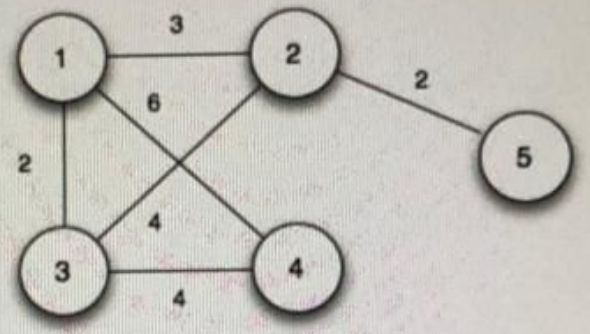
Question 1

Given the following undirected graph:



We apply Kruskal's algorithm to construct a MST. Follow the steps of the algorithm by filling in the blanks:

a) We define E_T to maintain the set of edges composing a minimum spanning tree, which is initially empty.

b) we pick edge {1,3} , then we pick edge {2,5} , then we pick edge {1,2} and then we pick edge {3,4} .

c) The algorithm stops when the number of picked edges = 4 .

d) The resultant MST will have a weight equal to 11 .

Moving to another question will save this response.

1 points

Question 2

Both dynamic programming and greedy method will solve optimization problems. In the space provided answer the following two questions:

a) In your own words, what is an optimization problem?

b) explain to me how does DP is different than the greedy method, when solving optimization problems.

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a) The optimization problem is finding the best solution of all possible solution, such as: minimum or maximum .

b) In DP it solves the all sub-problems, then choose the best of all of the solved. Unlike greedy, first will have decision of each subproblem, then we solve the result of sub-problem.

uestion 3

Given the following Alphabet and frequency table, use the Huffman coding algorithm to construct a coding tree by filling in the blanks in each step.

Alphabet: A, B, C, D, E, F, G, O

Frequency table:

A	B	C	D	E	F	G	O
12%	8%	19%	25%	43%	15%	13%	31%

Fill in the blanks in each of the following:

- After the algorithm terminates, the resultant code tree will have a root node with the value 1.66 .

- The code for letter A: 0111 .

G=1110

- The code for letter C: 010 .

The code for letter D: 110 .

The code for letter E: 10 .

Let $W = 10$ and

i	1	2	3	4
v_i	10	40	30	50
w_i	5	4	6	3

$V[i,w]$	0	1	2	3	4	5	6	7	8	9	10
$i = 0$	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	10	10	10	10	10	10
2	0	0	0	0	40	40	40	40	40	50	50
3	0	0	0	0	40	40	40	40	40	50	70
4	0	0	0	50	50	50	50	90	90	90	90

According to the solution table, the maximum item value that we can achieve **90**. By reconstructing the solution, we know that the following items **{2,4}** are included in the solution. Carefully, fill in the following blanks:

- The answer to the problem appears at cell <4,10> in the matrix.
- The cell in the table that lets me pick item4 is cell at location: _____.
- The cell in the table that lets me pick item3 is cell at location: _____.

Question 4

Moving to another question will save this response.

Question 5

1 points

Solve the following instance of the 0/1 Knapsack Problem using Greedy method. The greedy choice we are going to use is: pick the item with the maximum value.

The maximum allowed weight is W = 10.

Item	1	2	3	4	5	6
Value	6	4	5	3	9	7
Weight	4	2	3	1	6	4

Fill in the blanks in the following:

- the maximum value we can get is: 18 .

- the items we pick: { 1,2,3,4 }.

Question 6

Solve the following instance of the 0/1 Knapsack Problem using Dynamic programming.

The maximum allowed weight is W = 10.

Item	1	2	3	4	5	6
Price	6	4	5	3	9	7
Weight	4	2	3	1	6	4

Fill in the blanks in the following table:

0	1	2	3	4	5	6
0 0 0	0	0	0	0	0	0
1 0 0	0	0	6	6	6	6
2 0 0	4	4	6	6	10	10
3 0 0	4	5	6	9	10	11
4 0 3	4	7	8	9	12	13
5 0 3	4	7	8	9	12	13

4	5	6	7	8	9	10
	0	0	0	0	0	0
	6	6	6	6	6	6
	6	10	10	10	10	10
	9	10	11	11	15	15
	9	12	13	14	14	18
	9	12	13	14	14	18
	9	12	13	14	14	18